

CLAIMS

1. Connection element for tubes for medical use, comprising:

a main body defining at least one fluid passage between a first opening and a second opening which is at a distance from said first opening, said main body being designed to be attachable to the end of a first tube, and

a shut-off element made of an elastically deformable material and at least partly housed inside the main body, to allow or prevent, as required, fluid communication between said first and second openings of the main body, said shut-off element comprising in turn:

a fixing portion engaged on the main body;

an intermediate portion extending from said fixing portion, said intermediate portion having a longitudinal axis of symmetry and being axially deformable; and

a sealing portion extending on from the intermediate portion and designed to be moved, at least between a first

operating condition, in which the sealing portion shuts off the first opening and prevents fluid communication between the first and second openings, and a second operating condition in which the sealing portion is at a distance from the first opening to allow fluid communication between said first and second openings;

at least said deformable intermediate portion of the shut-off element being designed to deform symmetrically during the transition from said first condition to said second condition.

2. Connection element according to Claim 1, wherein, in said closed condition, the sealing portion of the shut-off element cooperates with a leading edge defining said first opening, said sealing portion being capable of being positioned level with the leading edge so that the connector element has a continuous distal surface.

3. Connection element according to Claim 2, wherein, in said closed condition, the sealing portion of the shut-off element is flush with said leading edge to define a distal surface of the connector element that is smooth and flat or slightly curved.

4. Connection element according to Claim 1, wherein the shut-off element has an outer surface comprising a transverse end surface and a lateral surface, which surfaces are intended, in said open condition, to be swept by the fluid.

5. Connection element according to Claim 4, wherein said lateral surface is in the form of a surface of revolution about said axis of longitudinal symmetry.

6. Connection element according to Claim 1, wherein the main body defines, in combination with said shut-off element, a fluid channel of axial-symmetric configuration with respect to said longitudinal axis of symmetry of the shut-off element.

7. Connection element according to Claim 6, wherein the fluid channel has axial-symmetric configuration with respect to said longitudinal axis of symmetry of the shut-off element, both in said closed condition and in said open condition.

8. Connection element according to Claim 1, wherein said main body comprises:

an outer body of essentially tubular configuration, and

a core fixed to the outer body and having an attachment portion for the fixing portion of the shut-off element to engage with.

9. Connection element according to Claim 8, wherein said core extends coaxially with the shut-off element in a radially inward position with respect to the outer body.

10. Connection element according to Claim 9, wherein said core has a tubular expansion at the axially opposite end from said attachment portion and from said shut-off element.

11. Connection element according to Claim 10, wherein the main body defines, in combination with said shut-off element, a fluid channel of axial-symmetric configuration with respect to said longitudinal axis of symmetry of the shut-off element; the fluid channel having axial-symmetric configuration with respect to said longitudinal axis of symmetry of the shut-off element, both in said closed condition and in said open condition; the fluid channel comprising:

a distal portion extending between said shut-off body and said outer body;

a proximal portion extending inside said

tubular expansion, and

a joining portion between said distal and proximal portions of said channel, extending through an intermediate section of the core between said tubular expansion and said attachment portion.

12. Connection element according to Claim 11, wherein the distal portion of the fluid channel has a radial dimension greater than the proximal portion, said joining portion comprising openings formed on said intermediate section and converging progressively towards said proximal portion of the channel.

13. Connection element according to Claim 12, wherein the converging openings are formed in symmetrically opposing pairs with respect to said longitudinal axis of symmetry.

14. Connection element according to Claim 11, wherein the intermediate portion of the shut-off element is capable of deforming axially while maintaining an essentially constant radial dimension, so that said distal portion of the channel has an essentially constant annular cross section.

15. Connection element according to Claim 1, comprising means for removably

coupling the main body to an auxiliary connection element connectable to a second tube.

16. Connection element according to Claim 1, comprising at least one first annular sealing element engaged on the outside of said main body, on said distal surface.

17. Connection element according to Claim 15, comprising a first annular sealing element engaged on the outside of said main body on said distal surface, and a second annular sealing element engaged on the outside of the main body at an axial distance from the first sealing element, said coupling means operating between said first and second sealing elements.

18. Connection element according to Claim 1, wherein said main body is made of a rigid material.

19. Connection element according to Claim 11, wherein said tubular expansion is designed so that a terminal portion of the first tube can be engaged upon it.

20. Connection element according to Claim 11, wherein the sealing portion, the intermediate portion and the fixing portion are

made of a single piece of elastomeric material.

21. Connection element according to Claim 8, wherein the outer body presents at least a passage on its lateral surface, the outer body externally carrying a grip body having at least a protrusion passing through said passage and joining the external body to the core.

22. Connection element according to Claim 21, wherein the core presents a recess on its lateral surface engaging with said protrusion.

23. Connection element according to Claim 22, wherein the recess is annular and said protrusion defines an undercut with respect to the outer body.

24. Connection element according to Claim 21, wherein the outer body presents a plurality of said passages on its lateral surface, the outer body externally carrying a grip body having a corresponding plurality of protrusions passing through said passages and joining the external body to the core.

25. Assembling process of a connecting element according to Claim 21, comprising the following steps:

preparing the outer body;

preparing the core;

positioning the core coaxially inside the outer body;

moulding the grip body over the outer body for creating the protrusion which goes through said passage and engages said recess thereby axially connecting the core to the outer body.

26. Connecting device for tubes for medical use, comprising a connector element in accordance with Claim 1.

27. Device according to Claim 26, comprising an auxiliary connection element connectable to a terminal portion of a second tube and designed to be engaged removably on the main body of said connector element to give fluid communication between the first tube and second tube.

28. Device according to Claim 27, wherein the auxiliary connection element in turn comprises a main body defining at least one fluid passage and having a coupling portion that mates with said outer body and a male element emerging from a base of said coupling

portion, said male element being designed to push said sealing portion of the shut-off member from said closed condition to said open condition.

29. Device according to Claim 28, wherein the male element is of axial-symmetric configuration with an axis of symmetry aligned with that of said shut-off element, when the connector element and auxiliary connection element are in mutual engagement.

30. Device according to Claim 28, wherein the male element comprises a collar with lateral ports arranged symmetrically with respect to said axis of symmetry, for the fluid to pass through.

31. Peritoneal dialysis line comprising:

at least one tube designed to be placed in communication with a peritoneum of a patient; and

at least one second tube designed to be placed in communication with at least one container of a fluid to be infused into said peritoneum and/or with a container for draining fluid coming from the peritoneum;

a connecting device according to Claim
26.

32. Tube for a peritoneal dialysis line, comprising at least one terminal portion fitted with a connection element in accordance with Claim 1.